Bacteriology of Moderate-to-Severe Diabetic Foot Infections and In Vitro Activity of Antimicrobial Agents

Reference:

Scientific Literature Review

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Podiatric Relevance:
With the rise in number of diabetic foot infections (DFIs) in the last 25 years, the need to have informed therapeutic choices and knowledge of the usual causative organisms has never been more important the podiatric physician. The bacteriology and susceptibility of moderate-to-severe DFIs specimens to antibiotics was analyzed in this article. The objective of this study was to better define the bacteriology and their antibiotic susceptibilities of these infections to allow clinicians to make informed choices.

Methods:
The authors’ analyzed the data from a recent large prospective multi-center trial (SIDESTEP clinical trial) that compared ertapenem and piperacillin-tazobactam for treatment of moderate-to-severe DFIs where 454 specimens from 433 patients were collected. Specimens were obtained by tissue biopsy or wound curettage (258), aspiration (52), and swab (132) technique. All required parenteral therapy and had not received systemic antibiotic therapy for more than 24h within the previous 72h. All susceptibility testing of all specimens was in accordance with the Clinical and Laboratory Standards Institute procedures at the R.M. Alden Research Laboratory.

Results:
From 427 culture-positive specimens out of 454 specimens, 1607 organisms were isolated by 3 different collection techniques (aspiration, swab, tissue) along with antimicrobial susceptibilities. Of these culture-positives, the majority (83.8%) demonstrated polymicrobial growth (more than 1 organism) that averaged nearly three species (2.7 aerobic, 2.3 anaerobic) per culture-positives. Nearly half (43.8%) of the culture-positives had mixed aerobic/anaerobic growth with 189 different species collected (115 aerobic, 74 anaerobic). Of the total 427 cultures-positives, Staphylococcus aureus was the most commonly isolated species per culture where 23.4% were of which oxacillin-resistant. Pseudomonas aeruginosa was the predominate gram-negative aerobic species, but was found in less than 10% of culture-positives. Although, anaerobic organisms were found in nearly half of the culture-positives, Clostridium spp. and Bacteroides spp. were the least likely to be found while Finegoldia magna was the predominant anaerobic species followed by Prevotella spp. and Porphyromonas spp.. The antibiotics that demonstrated the best susceptibility versus aerobic gram-positive organisms were vancomycin, daptomycin, and linezolid, but however, piperacillin-tazobactam, amoxicillin-clavulanate, and ertapenem noted resistance only to MRSA and a small number of other organisms. Piperacillin-tazobactam and quinolones were active against more than 90% of all aerobic gram-negative organisms, including P. aeruginosa strains. Ertapenem was active against all anaerobic organisms while piperacillin-tazobactam was active against all but B. fragilis and B. vulgatus strains.

Conclusions:
This complicated retrospective study shows that in patients with moderate-to-severe DFI may have polymicrobial, mixed gram-positive, gram-negative, and anaerobic infection per specimen collected. Therefore, empirical antibiotic therapy should usually include ertapenem or piperacillin-tazobactam, but in the case of culture-positive MRSA, vancomycin, linezolid, and daptomycin would be appropriate. Due to their high rate of resistance among staphylococci and anaerobic organisms, fluoroquinolones and clindamycin may be inadequate empirical antibiotic therapy alone and may require additional coverage.